hopelessly into totally unnecessary integration in order to get back to the professorial logarithm.

The nomenclature of photometrical quantities is dismissed in a few lines with the very true remark that "the tendency toward particular nomenclature of physical quantities has been carried to a burdensome excess in many cases, until it has assumed the nature of scientific fetichism." "The attempts" of Hospitalier are alluded to, but the author has paid so little attention to the matter that he falls into sad confusion in the use of the expression "illumination." The word is used in half a dozen senses—as a sensation, as a flux, as a quantity of light, and so on. It is true that the "lux" of Preece or Hospitalier are no guide, but the "carcel-metre" or the unscientific "candle-foot," when once understood, leave not the slightest ambiguity about the meaning of "illumination."

The chapter on standards of light is excellent, but the table of comparisons of standards, taken from Laporte, does not include the British candle. Only two items out of a dozen appear to agree with the more complete table of Palaz. The British candle, with all the refinements of the gas referees, is not a unit which does credit to physical science, but it is at least as definitely known, reproducible and measurable as any other standard of light.

The arrangement, illustrations and index are good; the spelling is English. A. P. T.

OUR BOOK SHELF.

The Nature and Work of Plants: an Introduction to the Study of Botany. By D. T. MacDougal, Ph.D., Director of the Laboratories, New York Botanic Garden. Pp. xvii + 218. (New York: The Macmillan Co. London: Macmillan and Co., Ltd., 1900.)

THIS is a bright and readable little volume, in which plants are treated of mainly from a natural history and physiological point of view. It deserves to be successful, if only as showing that it is possible to gain a fairly considerable, and certainly intelligent, insight into the ways of plants, and that without first mastering the mass of technical detail which too often renders elementary books on botany so repulsive to beginners.

The author commences with a general account of the materials of which plants are composed, and of the structures of which they are built up, the student being led to investigate for himself the different facts and principles enunciated. The phenomena of reproduction, irritability and the like are introduced as objects of observation, and in such a way as to arouse, rather than by satiating to quench, curiosity. The seed and fruit are more fully dealt with, as they afford examples in which adaptations to special purposes can be made out with some degree of clearness, and their individual peculiarities are well explained. If one feels some doubt as to the wisdom of selecting the coconut as an introductory example of a fruit, one cannot complain of the mode in which its structure is treated. The very interesting case of *Xanthium*, in which two fruits are contained in a common sheath, one seed of which germinates in one year whilst its fellow remains dormant till the following season, will probably be new to some readers on this side the Atlantic.

A short chapter on plant societies closes the volume, which may be warmly commended as one likely to excite an interest in many people who fancy that the acquirement of a more or less complicated vocabulary is an essential preliminary to a scientific study of plants. Naturally, the book is not without its faults. Some of these seem to be those of carelessness, of which there is an example on p. 11 in the implication that a dried plant consists of charcoal (!) and ash. But these defects are not numerous, and do not seriously affect the general excellence of the book

Practical Coal Mining. By George L. Kerr. Pp. x + 462. (London: Charles Griffin and Company, Ltd., 1900.)

IN the vigorous outburst of technical literature that the last few years have witnessed, the subject of mining has not been forgotten, and the student of this subject has his choice of a fair number of works of a high degree of merit, amongst which those published by Messrs. Griffin and Co. take foremost rank. It was therefore to be expected that a new book on coal mining, issued by these same publishers, ought to surpass anything previously written on this subject, or at any rate to present features of especial importance. It is to be regretted that these anticipations have been very far from being realised, and, indeed, that it is difficult to discover anything in the work now under review that justifies its publication. It is very largely made up of extracts from the works already referred to, as well as from others, nor are these extracts by any means the worst part of the book. The author's style is far from clear, and many passages might be quoted that would be quite unintelligible to any one who was not acquainted beforehand with the subject-matter; this obscurity of languages often merges into inaccuracy and want of precision—the latter fault being one of the most dangerous that could well be found in a book intended to be placed in the hands of a student. A couple of examples of this fault may be cited: on p. 3 the author writes that "the line at right angles to the direction of 'dip' is called the 'strike,'" a definition that is not true unless qualified by the statement that the line referred to is a line within the bed; it is obvious that there may be an infinite number of lines at right angles to the direction of dip, but only one of these is the strike. Again, on p. 326, we find the following: "When two shafts are sunk and connected by a passage, and the density (weight) of air in the two shafts is equal, no current of air will circulate, no matter what their respective sizes may be." This, again, is only true if it be postulated that both shafts are of precisely the same depth, otherwise an air current may circulate.

The author is weak whenever he touches upon scientific ground; he uses mechanical formulas without apparently appreciating their limitations, as, for instance, when he applies formulas for the bending of columns, ignoring the fact that these are only applicable within the elastic limit. Similarly, his mechanical conceptions of the work done by the winding engine (p. 221) are incorrect. That his chemistry is not much more satisfactory may be judged from the occurrence of such phrases as "glycerine nitrate" for nitro-glycerine, &c.

The best chapter in the book is that on "Modes of Working," the methods of coal-getting in use in Scotland being well described. Indeed, had Mr. Kerr confined himself to a small book describing merely those points in which Scotch practice differs from the English, notably in shaft-sinking, coal-getting and haulage, he would have produced a contribution of distinct value to the literature of coal mining, a phrase that can, unfortunately, not be applied to his present more ambitious attempt. H. LOUIS.

Bookkeeping for Business Men. By J. Thornton and S. W. Thornton. Pp. vi + 185. (London: Macmillan and Co., Ltd., 1900.) Price 3*s.* 6*d.*

BOOKKEEPING is only the application of common-sense principles to the classification and systemisation of accounts. Its purpose is to show how the financial facts of a business may be expressed in the clearest and shortest

©1901 Nature Publishing Group

way, so that the financial position can be readily understood. A pupil who has been taught arithmetic in a reasonable way can adapt his knowledge to the forms of bookkeeping in a few weeks when placed in an office. For people who have not had the advantage of a rational education, it is necessary to draw up hard and fast rules, which must be obeyed in order to keep accounts intelligibly. The volume under notice does this, by showing as simply as possible how a trader unfamiliar with bookkeeping may construct, keep and balance a set of account books suited to his own business. A set of "Automatic Balancing Charts" is published separately as a supplement to the book, and they are drawn up in such a way that it is almost impossible for a person of average intelligence to make an incorrect entry upon them. Both the book and the charts should prove of service to business men unfamiliar with the intricacies of bookkeeping.

Reports from the Laboratory of the Royal College of Physicians, Edinburgh. Edited by Sir Batty Tuke, M.D., and D. Noel Paton, M.D. Vol. vii. (Edinburgh: Oliver and Boyd, 1900.)

THIS volume consists of a series of original papers which, since the end of 1897, have emanated from the laboratory of the Royal College of Physicians of Edinburgh. Practically all these papers have been published previously in the medical or scientific journals, and in this form have no doubt been read by those interested in their subject-matter. This is, however, perhaps only partially true of two reports which were presented respectively to the Fishery Board for Scotland and to the Prison Commission for Scotland. The first report consists of sixteen monographs on the life-history and the physiology, under varying conditions, of the salmon; and concludes with a monograph, by Dr. Dunlop, upon the food value of the salmon at different seasons, and obtained from different sources.

Dr. Dunlop is also the author of a report to the Prison Commission for Scotland upon prision dietaries. The report seems to be an exhaustive one, and contains many suggestions with regard to the adaptation of the diets in prisons to the varying conditions and labour employments of the prisoners.

Mother, Baby and Nursery. By Gènevieve Tucker, M.D. Pp. xvi + 193. (London: T. Fisher Unwin, 1900.) Price 1*s.*

THIS is one of the many manuals written for the guidance of young mothers. The writer is an American doctor, but suitable to every mother are the clear and practical directions on the management of herself and her infant. The earlier chapters are concerned with heredity and the conditions favourable for the unborn child. The practical advice is valuable, but it is misleading that the author's opinions on questions of heredity are stated as generally acknowledged facts. The chapters on the care of the infant are suggestive and helpful, and the importance of early training in good habits beginning during the first month of life is insisted upon duly and wisely; but the following advice is extraordinary and *not* to be recommended: "Take a good-sized raisin, cut open, taking out the seeds, put it on the umbilicus." A chapter containing a classification of the diatheses of infants (scrofulous, tuberculous types, &c.) seems out of place in a manual of this description. At the end of the book there is a short and emphatic summary of what is and what is not to be done in the nursery; but among the "nursery don'ts" we notice the omission of a warning against a practice too common, at any rate, in this country, namely, the use of so-called baby-soothers.

Interest is added to the book by the introduction of photographs of young children, but we dislike to see advertisements embodied in the text.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Vortex Rings.

IN the course of some experiments preparatory to a lecture on vortex rings, I have introduced certain modifications which may be of interest to teachers and students of science.

The classic vortex-box is too well known to require much description. Our apparatus, which is rather larger than those in common use, is a pine box measuring about a metre each way, with a circular hole 25 cms. in diameter in one end. Two pieces of heavy rubber tubing are stretched diagonally across the opposite or open end, which is then covered with black enamel cloth tacked on rather loosely. The object of the rubber chords is to give the recoil necessary after the expulsion of a ring to prepare the box for a second discharge. Such a box will project air vortices of great power, the slap of the ring against the brick wall of the lecture hall being distinctly audible, resembling the sound of a flip with a towel. An audience can be given a vivid idea of the quasi-rigidity of a fluid in rotation by projecting these invisible rings in rapid succession into the auditorium, the impact of the ring on the face reminding one of a blow with a compact tuft of cotton.

For rendering the rings visible I have found that by far the best results can be obtained by conducting ammonia and hydrochloric acid gases into the box through rubber tubes leading to two flasks in which NH_4OH and HCl are boiling. Photographs of large rings made in this way are reproduced in Fig. 1, the side view being particularly interesting, showing the comet-like tail formed by the stripping off of the outer portions of the ring by atmospheric friction as it moves forward. It is needless to say that the experiment with the visible rings should be left until the end of the lecture. The power of the air-rings can be shown by directing them against a flat pasteboard box, stood on end at some distance from the vortex apparatus, the box being at once overturned or even driven off on to the floor. A large cluster of burning gas jets can be extinguished by the impact of a ring, a modification of which experiment can be shown on a small scale by shooting a capped shell in a shot-gun at a candle several paces off. If one's aim is good the candle will be extinguished by the invisible vortex.

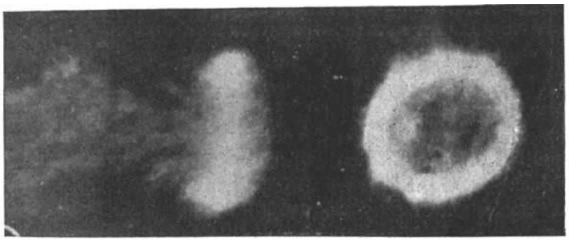

FIG. 1.

For showing the elasticity of the rings by bouncing one off the other, I find that the best plan is to drive two in rapid succession from the box, the second being projected with a slightly greater velocity than the first, all experiments that I have made with twin boxes having yielded unsatisfactory results.

Though the large vortices obtained with an apparatus of this description are most suitable for lecture purposes, I find that much more beautiful and symmetrical rings can be made with tobacco smoke blown from a paper or glass tube about 2·5 cms. in diameter. It is necessary to practice a little to learn just the nature and strength of the most suitable puff. Rings blown in this way in still air near a lamp or in full sunlight, when viewed laterally, show the spiral stream lines in a most beautiful manner. I have succeeded in photographing one of these rings in the following way. An instantaneous drop shutter was fitted to the door of a dark room, and an arc-lamp focussed on its aperture by means of a large concave mirror. The shutter was a simple affair, merely an aluminium slide operated with an elastic band, giving an exposure of 1/300 of a second. A photo-

©1901 Nature Publishing Group